

THE DETERMINANTS OF THE UNEMPLOYMENT RATE – EMPIRICAL EVIDENCE FROM ROMANIA

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Abstract:

Among other aspects, the 2007-2009 financial and economic crisis had an impact on the Romanian labor force, too. The aim of this article is to analyze the macroeconomic determinants of the unemployment rate in Romania, using an econometric model. We use the GDP, net and gross wage, monetary policy rate, inflation rate, budget deficit, average RON/EUR exchange rate, export and import values to estimate the model. The analyzed period is 2000-2009.

Keywords: regression model, unemployment rate, net exports, monetary policy rate, inflation rate

JEL code: C22, C53, E24

Introduction

Taking into consideration the effects of the 2007-2009 financial and economic crisis on the unemployment rate in Romania (in Q3 2009 it reached the values of 6.8%, which is higher with 9.22% than the value measured in 2007, and with 21.57% than the value measured in 2008), and knowing the negative social implications of an increasing unemployment rate, we find it important to seek the determinants that lay behind these values. The aim of this article is to identify those macroeconomic factors that have the greatest impact on the Romanian unemployment rate between 2000 and 2009. We do this in order to be able to suggest measures of decreasing it.

1. Literature review

Boianovsky, M. and Presley, J. R. (2009) use the theory first mentioned by Robertson, D. in 1930 which states that there is a connection between the natural rate of unemployment and the monetary policy rate. As Robertson, D. shows, there is a direct connection between the cyclical change of prices, the output and the employment on the long run. Boianovsky, M. and Presley, J.R. starting from the price expectations of the economy, using the theory of money illusion, deduce a relation between the monetary base, the interest rate, the real wages and the unemployment rate. They also emphasize on the differences between the Robertson and Keynes theories regarding the unemployment, which in their view lays mainly in the way they look at the interest rate, which has an impact on savings, consuming, and finally on the unemployment rate.

Fitzenbergern, B. and Garloff, A. (2008) who analyze the problems of the labor market in Germany, come to the conclusion that the main reason of the high unemployment rate is the low value of wages. According to the neoclassical views wages are determined by the marginal product of labor, therefore the increasing minimal wages lead to a decreasing wage and increasing unemployment rate.

Kooros, S. K. (2008) identifies those macroeconomic variables that have a significant effect on the unemployment rate. He estimates a multi-variable regression model, using GDP, the monetary policy rate, the budget deficit, the inflation rate, and the nominal wages.

Mussard, S. and Philippe, B. (2008) come to the conclusion that the unemployment rate in time t depends on the GDP and inflation rate in time $t-1$. In the study it is shown that through the process of money multiplier the GDP is in relations with the unemployment rate.

Guha, D. and Visviki, D. (2001) in their empirical research conducted on the USA, using data from the years preceding the 2nd World War, come to the conclusion that inflation, and labor marginal product cause the increasing unemployment rate. They show that the marginal product is in stronger relations with the unemployment, than the inflation is.

2. Methodology and data

We estimated the model using the OLS¹⁴⁹ method. To eliminate the autocorrelation we use the Cochrane-Orcutt procedure (Ramanathan, R., 2003).

In the model we tested 10 macroeconomic variables: seasonally adjusted GDP, net and gross wage, monetary policy rate, seasonally adjusted, cumulated inflation rate, budget deficit, average RON/EUR exchange rate, seasonally adjusted export, import and net export values. These appear in the literature mentioned above.

The source of the unemployment rate, average RON/EUR exchange rate and monetary policy rate is the monthly report of the National Bank of Romania¹⁵⁰. For better results we use the logarithmic value of the unemployment rate. The gross¹⁵¹ and net wages¹⁵² are values calculated by the authors, using the National Institute of Statistics data. We consider the average number of hours worked in a month as being 170¹⁵³, therefore, we calculate the gross and net wages as the rate of the gross and net wages per month and the number of hours worked in a month. The seasonally adjusted net export, export and import values, and the seasonally adjusted GDP¹⁵⁴ and seasonally adjusted cumulated inflation rate¹⁵⁵ data are taken from the National Institute of Statistics database.

The quarterly data come from Q1 2000 to Q3 2009 but because we use the moving average method to seasonally adjust the data, we lose 4 data; therefore, the number of observations is 35. The data from the sample are aggregated data that refer to the entire economy. The model is estimated using the Gretl¹⁵⁶ econometric software.

¹⁴⁹ Ordinary Least Squares, Ramanathan, R. (2003), pp.101.

¹⁵⁰ The National Bank of Romania (Banca Națională a României), Monthly Reports, <http://www.bnr.ro/PublicationDocuments.aspx?icid=1182>, downloaded on 02.01.2010.

¹⁵¹ National Institute of Statistics (Institutul Național de Statistică), average monthly gross wages between 1991-2009, <http://www.insse.ro/cms/pages/castiguri91-2010.do>, downloaded on 04.01.2010.

¹⁵² National Institute of Statistics (Institutul Național de Statistică), average monthly net wages between 1991-2009, <http://www.insse.ro/cms/pages/castiguri91-2010.do>, downloaded on 04.01.2010.

¹⁵³ Value taken from the Romanian accounting practice.

¹⁵⁴ National Institute of Statistics (Institutul Național de Statistică), quarterly GDP, seasonally adjusted, <http://www.insse.ro/cms/rw/pages/PIB-trim.ro.do>, downloaded on 02.01.2010.

¹⁵⁵ National Institute of Statistics (Institutul Național de Statistică), consumer price index, <https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=IPC102A>, downloaded on 16.12.2009.

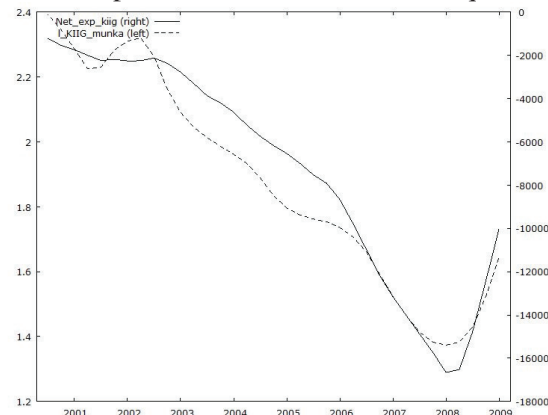
¹⁵⁶ Gnu Regression Time Series, econometric software, <http://gretl.sourceforge.net/>

3. The results of the empirical study

Leaving out the insignificant variables, we find that there are 3 determinants of the logarithmic values of the unemployment rate: seasonally adjusted net export, monetary policy rate, and seasonally adjusted cumulated inflation rate.

In *Figure 1* we can see the logarithmic values of the unemployment rate and the seasonally adjusted net export values between Q3 2000 and Q1 2009. We assume a positive correlation between the two.

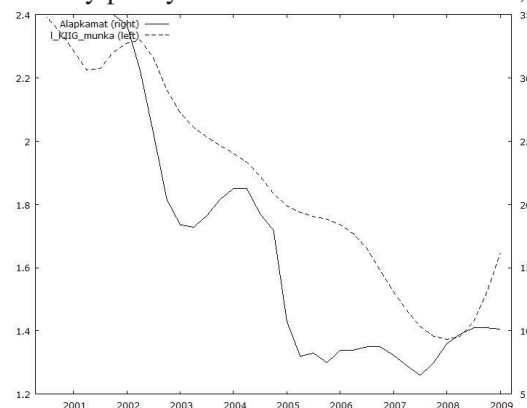
Figure 1: The logarithmic value of the unemployment rate and the seasonally adjusted net export between 2000 and 2009, quarterly data



Source: Authors' calculations, based on the National Bank of Romania monthly reports between 2000 and 2009 and the National Institute of Statistics TEMPO online database

In *Figure 2* we can see the logarithmic values of the unemployment rate and the monetary policy rate between Q3 2000 and Q1 2009. In this case too, we assume a positive correlation.

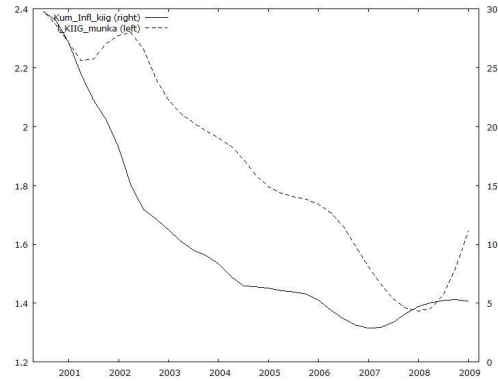
Figure 2: The logarithmic value of the unemployment rate and the monetary policy rate between 2000 and 2009, quarterly data



Source: Authors' calculations, based on the National Bank of Romania monthly reports between 2000 and 2009 and the National Institute of Statistics TEMPO online database

In *Figure 3* we can see the logarithmic values of the unemployment rate and the seasonally adjusted cumulated inflation rate between Q3 2000 and Q1 2009. In this case we assume a negative correlation.

Figure 3: The logarithmic value of the unemployment rate and the seasonally adjusted cumulated inflation rate between 2000 and 2009, quarterly data



Source: Authors' calculations, based on the National Bank of Romania monthly reports between 2000 and 2009 and the National Institute of Statistics TEMPO online database

The results of the Cochrane-Orcutt model are shown in *Table 1*. The dependent variable is the logarithmic values of the unemployment rate.

Table 1: Cochrane - Orcutt model

Explanatory (independent) variables	Coefficient	Standard error	t-statistics	p-value
Constant	2.05986	0.068052	30.27	4.82E-24
Net export	4.39E-05	4.57E-06	9.6	1.17E-10
Monetary policy rate	0.007846	0.00222	3.534	0.0014
Cumulated inflation rate	-0.01244	0.007077	-1.758	0.089
Average value of the logarithmic unemployment rate: 1.8555854 Adjusted R ² : 0.994173 F(3,30): 38.25734 p-value (F): 2.24e-10 Standard error of regression: 0.024371 Durbin-Watson: 0.996650				

Source: Authors' calculations

According to the results of the adjusted R^2 and global F statistics we can conclude that the built model is a good estimation.

The function derived from the model is the following:

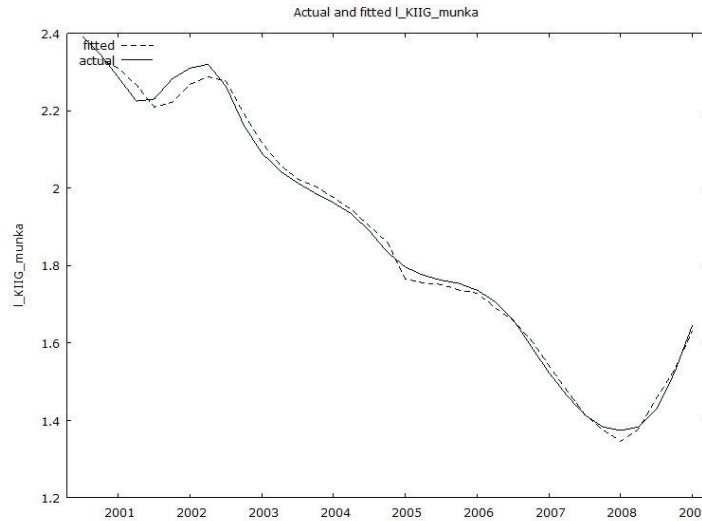
$$\text{Log_unem}_t = 2.05986 + 4.39 \cdot 10^{-5} \text{net exp}_t + 0.007846 \cdot \text{mon. pol. rate}_t - 0.01244 \cdot \text{inf. rate}_t + \varepsilon_t,$$

where $t = \overline{1,35}$ and ε_t is the residuum.

As we assumed, the seasonally adjusted net export and the monetary policy rates increase the value of the logarithmic value of the seasonally adjusted unemployment rate, the cumulated seasonally adjusted inflation rate decreases the value of the logarithmic value of the seasonally adjusted unemployment rate.

Figure 4 shows the fitted and actual values of the logarithmic unemployment rate. As we can see the fitted values are a good estimation of the actual values.

Figure 4: Actual and fitted values of the logarithmic value of the unemployment rate, between 2000 and 2009, quarterly data



Source: Authors' calculations

The increase in the net export causes the increase of the unemployment rate. This can be explained by the fact that in those periods, when the import values are high, the domestic currency is depreciated, therefore it is less attractive for investors, and therefore, unemployment increases.

The increasing monetary policy rate increases the unemployment rate, as well, because higher rates mean higher costs for the companies, that moderates economic growth and therefore increase unemployment.

However, the increasing inflation rate decreases the unemployment rate, which is in correlation with the result found by researchers quoted in the literature review.

Among the three variables, the coefficients of the independent variables are small, besides the inflation rate, so we can conclude that the inflation rate is the main determinant of the unemployment in Romania.

4. Conclusions

In our study, we analyze the macroeconomic determinants of the unemployment rate in Romania. For the estimation of the model we use quarterly data from the period 2000-2009. We find that the seasonally adjusted net export, the monetary policy rate and the inflation rate are those dependent variables that have a significant influence on the seasonally adjusted logarithmic value of the unemployment rate.

The positive and negative signs of the independent variables are those expected: the net export and the monetary policy rates increase the value of the unemployment rate, whereas the cumulated seasonally adjusted inflation rate is in correlation with economic growth, therefore decreases unemployment rate.

With the identification of the determinants of the unemployment rate we have a chance of proposing such monetary policies that can decrease the unemployment rate, mainly through the monetary policy rate, but also through the inflation rate. Moreover, we show that it is equally important to have a coherent foreign trade policy in order to be able to decrease the unemployment rate.

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